said to have a total length dimension extending from trough initiation site **39** to a terminus farthest downstream from the passage hole inlet **30**, i.e., to the point at which the troughs meet outer surface **26** (i.e., site **52** in FIG. **3**). In some embodiments, substantially all of the plateau is located in a region that is more than about 40% of the total length dimension away from site **39**. In some other preferred embodiments, substantially all of the plateau is located in a region that is more than about 60% of the total length dimension away from site **39**.

[0051] In some embodiments, the plateau, from a plan view ("top view") like that of FIG. **3**, can have the shape of a triangle, a trapezoid, or any other polygon. FIG. **3** shows plateau **50** in the shape of a trapezoid. FIG. **4** is illustrative of a plateau having the shape of a triangle. (In this figure, features similar or identical to those of FIGS. **2** and **3** are not labeled). In FIG. **4**, the plateau **60** rises above valley **62**. The triangle of the plateau includes an upstream vertex **64**, lying generally in a midpoint area between the two troughs **66**, **68**, in line with axis **70**, and pointing toward passage hole inlet **72**. However, the vertex need not be aligned with axis **70**, e.g., it can be "off-center". Moreover, the triangle itself need not be equilateral. As mentioned previously, the precise shape for the plateau is determined in large part by the manner in which it is formed. (The two troughs can also vary somewhat from each other, e.g., in depth and shape).

[0052] FIG. **5** is an illustration of another embodiment of a portion of a passage hole **80**, shown as a top view of the outer surface ("hot surface") **82** of a substrate. In this figure (somewhat similar to FIG. **7**, discussed below), plateau **92** is situated between troughs **86** and **88**. (The plateau can generally lie in the same plane as outer surface region **93**, although the figure seems to show plateau **92** as being angled upwardly from region **93**). A valley **90** slopes downwardly from the plateau, toward an inlet bore (not specifically shown) extending into the substrate. The plateau can vary in height, relative to surface **82**. In some embodiments, the height of the plateau is about 2% to about 20% of the length-dimension extending from the passage hole-exit to a terminus farthest away from the hole-exit.

[0053] Moreover, in some embodiments, the features of surface **90**, trough **86**, and trough **88** can all merge into the inlet bore. Furthermore, in some instances, the edges **98** and **100**, formed by the intersections of surfaces **86** and **90**; and **88** and **90**, respectively, need not be "sharp", straight line edges. For example, they could, independently of each other, be curved or "rounded". As depicted in FIG. **6**, which is a sectional portion of a passage hole like that of FIG. **5**, top surface/valley **102** could also be curved, along a general "arc" extending across from one trough to another trough (troughs not shown here), or along some other line of curvature.

[0054] FIG. **7** is a view of a passage hole **108**, having another chevron shape, according to embodiments of this invention. (Features similar to those in FIGS. **2** and **3** may not be labeled here). A transverse sectional view is provided in the lower half of the figure, showing an inlet bore **110**, situated along axis **112**. The upper half of the figure is a plan view or "top view". In this embodiment, plateau **114** is a raised region, farthest from inlet hole **118**. A valley **120** is adjacent the plateau, extending along axis **112**. The valley has a top surface **122** which slopes down, in the direction of inlet hole **118**.

[0055] As mentioned above, articles like those described herein are often covered by one or more coatings. Coatings which serve a number of purposes may be used. Frequently, coatings which provide thermal protection, and/or oxidation protection are applied. As one example, an article such as a gas turbine blade may be covered by a ceramic coating, e.g., a thermal barrier coating (TBC) formed of a zirconia material such as yttria-stabilized zirconia. In many cases for turbine blades, a bond layer is first applied over the blade surface, e.g., a metal-aluminide or MCrAlY material, where "M" can be iron, nickel, cobalt, or mixtures thereof. These coating systems are described in many references, such as the Bunker '755 patent mentioned previously.

[0056] FIG. **8** is a transverse sectional view of another passage hole **123**, extending through a substrate **125**, according to some inventive embodiments. In this instance, the outer surface ("hot" surface) **124** of the substrate is covered by a protective coating system **126**, which as described above, can constitute one or more individual coatings. The thickness of the protective coating can vary greatly (e.g., about 0.005 inch (127 microns) to about 0.050 inch (1270 microns), depending on various factors. In the case of a nickel superalloy-based turbine blade used in the "hot" section of a land-based gas turbine, protective coatings often have a thickness in the range of about 0.015 inch (381 microns) to about 0.045 inch (1143 microns), and most often, about 0.020 inch (500 microns) to about 0.035 inch (889 microns). The passage hole **123** is formed through the substrate **125** and through the coating **126** by one of the techniques described below.

[0057] With continuing reference to FIG. **8**, plateau **128** extends from and rises above valley **130**. In this instance, the "front face" **132** of the plateau is sloped in the direction of inlet bore **134**. However, the shape and size of the plateau and the surrounding valley can vary considerably, depending on various factors. They include the desired exit geometry for the coolant fluid which will travel through the passage hole, and also the technique by which the hole and chevron area are formed within coating **126** and substrate **125**. The ability to modify film cooling characteristics through protective coatings, according to new coolant flow geometries, is an important aspect for embodiments of this invention.

[0058] The passage holes of the present invention can be formed successfully by several specialized techniques, using selected types of equipment. The techniques can include water jet cutting systems, electric discharge machining (EDM) systems, and laser-drilling systems. Each of these systems is described below. Moreover, in some cases, each of these techniques can be carried out by using the specific instrument in a single or repeated plunging motion, as also described below. (In this description, the EDM is said to involve treatment of the substrate with a "contacting device"; while water jet cutting systems and laser-drilling systems are said to involve treatment of the substrate with a "contacting medium", as further described below).

[0059] As alluded to above, in some embodiments, the passage holes are formed by a water jet cutting process, e.g., an abrasive water jet cutting process. Such a process, sometimes referred to as a "water saw", is known in the art, and described in many references. Non-limiting examples include U.S. Pat. No. 6,905,396 (Miller et al); U.S. Pat. No. 5,979,663 (Herrmann et al); U.S. Pat. No. 5,851,139 (Xu); and U.S. Pat. No. 5,169,065 (Bloch), all incorporated herein by reference.

[0060] In general, the water jet process utilizes a high-velocity stream of abrasive particles (e.g., abrasive "grit"), suspended in a stream of high pressure water. The pressure of the water may vary considerably, but is often in the range of